

What is claimed is:

1. A printer control device, comprising:

a joining unit that causes at least one network printer to join a predetermined multicast address;

5 a transmission unit that converts print data into packets and multicast transmits the packets to the predetermined multicast address; and

10 a control unit that monitors transmission/reception status of the packets at the at least one network printer that has joined the multicast address and that, based on monitoring results, controls transmission of packets to, waiting for packets from, and retransmission of packets to the predetermined multicast address.

15 2. A printer control device as claimed in claim 1, further including a detection unit that detects network printers that are capable of joining a multicast address.

20 3. A printer control device as claimed in claim 2, further comprising a network printer selection unit capable of selecting at least one network printer to use in actual printing from the network printers detected by the detection unit.

25 4. A printer control device as claimed in claim 3, further comprising a print copy number setting unit that sets a number of copies to be printed by each of the at least one network printer selected by the network printer

selection unit.

5 5. A printer control device as claimed in claim 1,
further comprising an operation procedure unit that presets
transmission operations, waiting operations, and
retransmission operations of the control unit with regard to
the predetermined multicast address to depend on packet
reception/transmission status at the at least one network
printer that joined the predetermined multicast address.

10 6. A printer control device as claimed in claim 1,
further comprising a retransmission unit that retransmits
the same packet to the predetermined multicast address when
the control unit does not receive within a certain duration
of time an acknowledgement response, which indicates
reception of the packet transmitted from the transmission
15 unit, from all network printers that have joined the
multicast address.

20 7. A printer control device as claimed in claim 6,
wherein the control unit does not receive acknowledgement
responses because of transmission problem that occurred on
the network.

25 8. A printer control device as claimed in claim 1,
wherein the transmission unit transmits a subsequent packet
to the multicast address when the control unit does not
receive within a certain duration of time an acknowledgement
response, which indicates reception of the packet

transmitted from the transmission unit, from any one of the network printers that have joined the multicast address.

9. A printer control device as claimed in claim 1, further comprising:

5 a printing completion judgment unit that judges whether, after a certain duration of time elapses from when the transmission unit transmits the print data, the network printer has completely printed out the print data transmitted by the transmission unit; and

10 a retransmission unit that, when the printing completion judgment unit judges that the network printer has not completely printed out the print data, retransmits print data transmitted by the transmission unit.

15 10. A printing control unit as claimed in claim 9, wherein the retransmission unit retransmits all of the print data transmitted by the transmission unit.

20 11. A printing control unit as claimed in claim 10, further comprising a print starting unit that controls the network printer to print out a message indicating that following printing is a replacement printing, before controlling the network printer to print the incompletely printed print data from the last incompletely printed page.

25 12. A printing control unit as claimed in claim 9, wherein the retransmission unit retransmits only incompletely printed portions of the print data transmitted

by the transmission unit.

13. A printing control unit as claimed in claim 12, further comprising a print starting unit that controls the network printer to print out a message indicating that following printing is a supplementary printing, before controlling the network printer to print the incompletely printed print data from the last incompletely printed page.

14. A printing control unit as claimed in claim 9, wherein the retransmission unit retransmits the print data to the multicast address in order to multicast transmit the print data to any network printer that did not complete printing of print data transmitted from the transmission unit.

15. A printing control unit as claimed in claim 9, wherein the retransmission unit retransmits the print data a single time.

16. A printing control unit as claimed in claim 9, wherein the retransmission unit retransmits the print data a plurality of times.

17. A printing control unit as claimed in claim 16, wherein the transmission unit retransmits the print data repeatedly each time a fixed period of time elapses.

18. A printing control unit as claimed in claim 16, wherein the transmission unit retransmits the print data repeatedly at a changeable timing.

19. A printing control unit as claimed in claim 18, further comprising a selection unit enabling a user to select number of retransmission times and an inter-retransmission time duration of retransmission performed by the retransmission unit.

20. A network printer comprising:
a network interface connected to a network; and
a multicast joining unit that joins a multicast address.

21. A network printer as claimed in claim 20, wherein the network multicast joining unit joins the multicast address on its own accord.

22. A network printer as claimed in claim 20, wherein the network multicast joining unit joins the multicast address by a command from a printing control device connected to the network

23. A network printer as claimed in claim 22, further comprising a refusing unit that refuses the command from the printing control device when already a member of another multicast address.

24. A network printer as claimed in claim 22, further comprising a response unit that sends the printing control device an acknowledgement response indicating that a packet of print data was received from the printing control device, a negative acknowledgement response indicating that the

packet was not received from the printing control device, or a retransmit response requesting the printing control device to retransmit the packet.

25. A network printer as claimed in claim 20, further comprising a leave unit for leaving the multicast address.

26. A print control method comprising:

causing at least one network printer to join a multicast address;

transmitting a packet of print data to the multicast address;

monitoring transmission/reception status of packets at the at least one network printer that joined the multicast address; and

controlling transmission of packets, waiting for packets, and retransmission of packets with respect to the multicast address according to monitoring results.

27. A printing control method as claim in claim 26, further comprising:

retransmitting the print data when the print data is not completely printed after a time period elapses after transmitting the packet of print data.

28. A printing control method as claimed in claim 27, wherein all of the print data is retransmitted.

29. A printing control method as claimed in claim 27, wherein only incompletely printed portions of the print data

are retransmitted.

30. A printing control method as claimed in claim 27, wherein the print data is retransmitted a single time.

31. A printing control method as claimed in claim 27, wherein the print data is retransmitted a plurality of times.

32. A printing control method as claimed in claim 31, wherein the print data is retransmitted repeatedly at a fixed timing.

33. A printing control method as claimed in claim 31, wherein the print data is retransmitted repeatedly at a changeable timing.

34. A printing control method as claimed in claim 27 wherein the step of retransmitting the print data includes retransmitting the print data to the multicast address in order to multicast transmit the print data to any network printer that did not completely print out transmitted print data..